# GENERAL INDEX TO VOLUME XIII.

[Note.—Titles of papers are printed in italics; names of authors and participants in debate are printed in small caps.]

|   | AGE |
|---|-----|
| Air resistances at high train speeds  |     |
| ALDEN, G. I., disc., two-cylinder vs. multi-cylinder engines                | 666 |
| ALDRICH, W. S., on compounding centrifugal and load governing by a rotary   |     |
| piston valve  |     |
| Amendments to rules, circular on  | 32  |
| Annealing of structural steel   | 579 |
| Appendix III., to report on standard methods of test and testing materials  | 276 |
| Appendix IV., to report on standard methods of test and testing materials   | 289 |
| Armstrong, E. J., disc., lead in high-speed engines                         | 260 |
| ASHWORTH, DANIEL, disc., combination pavement                               | 207 |
| " equalizing draft in boilers   | 245 |
| " " feed-water purification   | 250 |
| Autographic recording apparatus for use in testing materials, Thomas Gray . | 633 |
| BALL, FRANK H., disc., standard sizes for keys                              | 233 |
| BARNES, D. L., disc., rise or fall of a mercurial thermometer               | 74  |
|   |     |
| Bixby, Edgar M., memorial notice of   | 679 |
| Bleloch, George H., memorial notice of                                      | 673 |
| BOND, GEORGE M., disc., shafting clutches                                   | 237 |
| " standard sizes for keys   | 233 |
| BORDEN, T. J., disc., a novel fly-wheel                                     | 6:9 |
| Brooklyn pumping engines of 1860, S. W. McElroy                             | 83  |
| CARTWRIGHT, ROBERT, disc., lights for outdoor work                          | 236 |
| " " shafting clutches   |     |
| " " the value of a water power  |     |
| Chimney draft, idiosyncrasies of  |     |
| Chimney stacks for batteries of boilers                                     |     |
|   | 393 |
|   | 236 |
| Cogswell, W. B., disc., feed-water purification                             | 255 |
| Cold rolling  | 62  |
| COLE, J. WENDELL, a combination iron and oak pavement                       | 199 |
| Columbian exposition tests  | 11  |
| Combination iron and oak pavement, J. Wendell Cole                          | 199 |
| Committee on standards  | 22  |
| Committee on standard flanges   | 307 |
| Committee on standard flanges report  | 31  |
| Committee on standard methods of test                                       | 23  |
| Committee on standard units   | 11  |

| ,   | AGE |
|---|-----|
| Compounding centrifugal and load governing by a rotary piston valve, W. S.    |     |
| Aldrich   | 325 |
| Compound locomotives  | 656 |
|   | 678 |
| COOPER, JOHN H., a self-lubricating fiber-graphite for the bearings of ma-    |     |
| chinery   | 374 |
|   | 656 |
|   | 680 |
| CRANE, W. E., the idiosyncrasies of chimney draft                             | -   |
| " disc., combination pavement   |     |
| CUMMINGS, GEO., disc., fiber-graphite.  |     |
| CUMMINGS, CIEO., CISC., HOET-graphite   | 900 |
| Dashiell, B. J., the electric railway as applied to steam roads               | 359 |
| DEAN, F. W., disc., steam jackets of Pawtucket pumping engine                 | 198 |
| Density of water at different temperatures, A. F. Nagle                       | 396 |
| DENTON, J. E., summary of results of principal experimental measurements      | 000 |
| of performance of refrigerating machines                                      | 507 |
| " disc., chimney draft  | 222 |
| disc., chimney diate  |     |
| DICKIE, GEO. W., disc., a novel fly-wheel                                     |     |
| noer-graphine   |     |
| definization of ocean waves   |     |
| DINGEE, W. W., disc., lights for outdoor work                                 | 235 |
| " " shafting clutches   |     |
| " " threads on a half-inch bolt   | 247 |
| Dues raised   | 32  |
| DURFEE, W. F., in memoriam, A. C. Hobbs                                       | 263 |
| " " Geo. H. Bleloch   | 673 |
| Dynamometer for locomotive  | 427 |
| Dynamometers by transmission  | 531 |
| Economy and efficiency of the steam engine, C. H. Peabody                     | 337 |
| Elastic curve and treatment of structural steel, G. C. Henning                |     |
| Election of officers, amendment   |     |
| Electric power distribution, H. C. Spaulding                                  |     |
| Electric railway as applied to steam roads, B. J. Dashiell, Jr                |     |
|   |     |
| EMERY, C. E., disc., Brooklyn pumping engines                                 |     |
| equanzing drate in boners   |     |
| minutations of steam-engine economy   | 80  |
| snarting clutches   |     |
| " test of a pulsometer  | 216 |
| " " the value of a water power  |     |
| Engine economy, limitations of  | 77  |
| European engineers, invitation to   | 15  |
| Evolution of American rolling mills, R. W. Hunt                               | 45  |
| Experimental locomotive, W. F. M. Goss  | 427 |
| Experiments to determine the rate of rise or fall of a mercurial thermometer, |     |
| A. F. Nagle   | 70  |
| Experiment with aluminium, W. W. Christie                                     | 393 |
|   |     |
| FALKENAU, ARTHUR, disc., feed-water purification                              |     |
| Feed-water purification.  | 248 |

| GENERAL INDEX.  | 707   |
|---|-------|
|   | PAGE  |
| Fiber-graphite for bearings   |       |
| Fly-wheel, a novel  |       |
| Fowler, Geo. L., disc., combination pavement                                  |       |
| " " standard sizes for keys   |       |
| Friction of sand under compression  | 539   |
| FALE, H. B., disc., two-cylinder vs. multi-cylinder engines                   | 662   |
| Gatewood and Stahl's wave motor   |       |
| Goss, W. F. M., an experimental locomotive                                    | 427   |
| Governing by a rotary piston valve  | 325   |
| Grant, W. H. E., memorial notice of   |       |
| Graphite for bearings   |       |
| GRAY, THOMAS, the measurement of power  |       |
| " autographic recording apparatus for use in testing materials.               | 633   |
| GREEN, SAMUEL M., two-cylinder vs. multi-cylinder engines                     | 647   |
| Handren, John W., memorial notice of  | 686   |
| HARKNESS, H. W., disc., fiber-graphite  |       |
| HAWKINS, J. T., disc., feed-water purification                                | 251   |
| " " increase in life-fees   |       |
| " standard sizes for keys   | 230   |
| " " threads on a half-inch bolt   | 247   |
| Henning, Gus. C., on the elastic curve and treatment of structural steel      | 571   |
| " disc., autographic recording apparatus for testing machines                 | . 640 |
| " " increase in life-membership fee   | . 37  |
| Hibbard, H. D., disc., an experiment with aluminium                           | . 395 |
| Higgins, M. P., disc., machine molding  | 553   |
| Hirn, G. A., monument for   |       |
| Hobbs, Alfred Charles, in memoriam, by W. F. Durfee                           | . 263 |
| HOLLOWAY, J. F., disc., report on standard tests                              | . 25  |
| Hoppes, J. J., disc., feed-water purification                                 | . 253 |
| Humphreys, Jno. W., disc., increase in life-fees                              |       |
| Hunt, R. W., president's address, 1891  |       |
| " disc., increase in dues   |       |
| " report on standard tests  |       |
| Huson, W. S., disc., standard sizes for keys                                  |       |
| HUTTON, F. R., disc., limitations of steam-engine economy                     |       |
| Idiosyncrasies of chimney draft, W. E. Crane                                  |       |
| Impulse water wheels  |       |
| Indiana block coal under boilers  | . 131 |
| Influence of the steam jackets of the Pawtucket pumping engines (third paper) |       |
| Wm. Kent  |       |
| Initiation fees increased   |       |
| Invitation to European engineers  | . 15  |

Jacobus, D. S., summary of results of principal experimental measurements

44

 of performance of refrigerating machines.
 507

 disc., chimney draft.
 225

 " density of water.
 407

steam jackets of Pawtucket pumping engine....... 190

|  | AGE |
|--|-----|
| JACOBUS, D. S., disc., two-cylinder vs. multi-cylinder engines     | 660 |
| " tests of a portable boiler                                       |     |
| " " utilization of ocean waves                                     | 496 |
| Квітн, N. S., disc., fiber-graphite                                | 385 |
| Kent, WM., influence of the steam jackets of the Pawtucket pumping | -   |
| engine (third paper)   | 176 |
| " disc., Brooklyn pumping engines                                  | 180 |
| " " chimney draft  | 993 |
| " density of water   |     |
| " " economy and efficiency of the steam engine                     |     |
| " " equalizing draft in boilers                                    |     |
| " " feed-water purification  |     |
| " " lights for outdoor work  |     |
|  |     |
| Sharting clutches  |     |
| Statidard Sizes for keys   |     |
| test of findiana block coal,                                       |     |
| Keys, standard sizes for   | 229 |
| LAFORGE, FRED'K H., disc., a novel fly-wheel                       | 630 |
| LANZA, GAETANO, disc., report on standard tests                    |     |
| Lead in high-speed automatic engines                               |     |
| LE VAN, W. B., disc., chimney draft                                |     |
| " " combination pavement   |     |
| " " equalizing draft in boilers                                    |     |
| Lewis, Wilfred, disc., a novel fly-wheel                           |     |
| Life-membership fee increased.                                     |     |
| Lights for outdoor work at night.                                  |     |
| Limitations of steam-engine economy, A. F. Nagle                   |     |
| Liquid-steel rolling   |     |
| Locomotive, an experimental  |     |
| Locomotive dynamometer   |     |
|  |     |
| MacFarren, S. J., disc., electric power distribution               | 174 |
| Machine molding, Harris Tabor                                      | 537 |
| Mahony, James, memorial notice of                                  |     |
| MAIN, CHAS. T., the value of a water power                         | 140 |
| MANNING, C. H., a novel fly-wheel                                  |     |
| MANSFIELD, A. K., disc., a novel fly-wheel                         |     |
| McBride, Jas., disc., a novel fly-wheel                            | 628 |
| " " shafting clutches  |     |
| McElroy, S. W., the Brooklyn pumping engines of 1860               |     |
| Measurement of power, Thos. Gray                                   | 531 |
| Memorial notices of members deceased, 1891-1892.                   | 671 |
| Mercurial thermometer, rate of rise or fall of                     |     |
| Minott, Hiram P., memorial notice of                               |     |
| Molding machinery.   |     |
| MOLERA, E. J., disc., density of water                             |     |
| " " utilization of ocean waves                                     | 400 |
| MOORE, D. G., disc., machine molding                               | 558 |
|  | 000 |

| P.   | AGE |
|--|-----|
| NAGLE, A. F., experiments to determine the rate of fall or rise of a mercurial |     |
| thermometer  | 70  |
| " limitations of steam-engine economy  | 77  |
| " test of Indiana block coal at the Chicago West Side pumping                  |     |
| station  | 131 |
| " the density of water at different temperatures                               | 396 |
| NASON, C. W., presents report on standard flanges                              | 31  |
| Notes on a problem in water power, Jno. Richards                               | 331 |
| Novel fly-wheel, C. H. Manning   |     |
| ,  |     |
| Ocean waves, power of  | 438 |
| ODELL, W. II., disc., feed-water purification                                  |     |
| Officers, election of, to be amended   |     |
| Chieces, election of, to be uncondensitive.                                    | 00  |
| PARKHURST, E. G., disc., standard sizes for keys                               | 990 |
| PARSONS, H. DE B., disc., combination pavement                                 | 206 |
| Pavement, a combination iron and oak.  |     |
| PEABODY, C. H., economy and efficiency of the steam-engine                     |     |
| " dise., limitations of steam-engine economy                                   |     |
| Percival, Geo. S., memorial notice of  | 600 |
|  |     |
| Plate mills Porter, Geo. A., memorial notice of                                |     |
|  |     |
| PORTER, CHAS. T., disc., equalizing draft in boilers                           |     |
| threads on a mair-inch boit  |     |
| Power measurement  |     |
| President's annual address, 1891, R. W. Hunt                                   |     |
| Price, John A., memorial notice of   |     |
| Proceedings New York meeting (xxivth), 1891                                    |     |
| Proceedings San Francisco meeting (xxvth), 1892                                |     |
| Pulsometer, test of a  |     |
| Pumping engines of 1860  |     |
| Purification of feed water   | 248 |
|  |     |
| Raising of dues  | 32  |
|  | 633 |
| Reed, Edward M., memorial notice of  | 676 |
| Refrigerating machines, summary of results                                     |     |
| Reunions in Society house  | 21  |
|  | 672 |
|  | 554 |
|  | 331 |
| RITES, F. M., the steam distribution in a form of single-acting compound       |     |
| engine   | 557 |
|  | 647 |
| ROELKER, H. B., disc., feed-water purification                                 | 251 |
| " standard sizes for keys  | 235 |
| ROGERS, W. S., disc., increase in life-fees                                    | 38  |
| " " lights for outdoor work  |     |
| " standard sizes for keys  |     |
| Rolling mills evolution of   |     |

|   | PAGE |
|---|------|
| Scheffler, F. A., disc., chimney draft  |      |
| " " fiber-graphite  | 386  |
| tests of a portable boller  | 425  |
| SEE, Horace, disc., steam jackets of Pawtucket pumping engine                 |      |
| Seif-lubricating fiber-graphite for the bearings of machinery, John H. Cooper |      |
| SEWALL, M. W., disc., shafting clutches                                       |      |
| Shafting clutches   |      |
| Single-acting compound engine   |      |
| SMITH, OBERLIN, disc., combination pavement                                   |      |
| " " electric power distribution   |      |
| threads on a nair-inch boil   |      |
| Social reunions inaugurated   |      |
| Some tests of a Portable Boiler, W. O. Webber                                 |      |
| Spaulding, H. C., electric power distribution                                 |      |
| SPIERS, J. W., disc., fiber-graphite  |      |
| STAHL, A. W., the utilization of the power of ocean waves                     | 438  |
| Standards, committee on   | 22   |
| Standard flanges, committee on report   | 30   |
| Standard flanges, report on (preliminary)                                     | 307  |
| Standard methods of test and testing materials, report of                     | 23   |
| Standard sizes for keys   | 229  |
| Standard units, committee on  | 11   |
| Steum distribution in a form of single-acting compound engine, F. M. Rites.   | 557  |
| Steam jackets, influence of   | 176  |
| Steel, structural treatment of  | 571  |
| STEEN, E. T., disc., wave motors  | 501  |
| STODDER, E. D., disc., wave motors  | 494  |
| STUT, E. T., disc., two-cylinder vs. multi-cylinder engines                   | 664  |
| Summary of results of principal experimental measurements of performance      |      |
| of refrigerating machines, J. E. Denton and D. S. Jacobus                     |      |
| SWEET, JNO. E., disc., combination pavement                                   |      |
|   |      |
| TABOR, HARRIS, machine molding  | 537  |
| Taylor, J. Archie, memorial notice of   |      |
| Tests of a portable boiler  | 413  |
| Test of a pulsometer, De Volson Wood  | 211  |
| Test of Indiana block coal at the Chicago West Side pumping station, A. F.    |      |
| Nagle   | 131  |
| Thermometer, rate of rise or fall of  |      |
| Threads on half-inch bolt   | 245  |
| THURSTON, R. H., disc., density of water                                      | 410  |
| " " economy and efficiency of the steam-engine                                | 351  |
| Tire-rolling mill   |      |
| Topical queries, New York meeting of 1891.                                    |      |
| TOWNE, H. R., disc., report on standard tests                                 |      |
| Transcontinental trip of 1892   |      |
| Trowbridge, William P., memorial notice of                                    |      |
| TRUMP, C. N., disc., fiber-graphite.  |      |
| Two-cylinder vs. multi-cylinder engines, Green & Rockwood                     |      |
| Typan J. W. memorial notice of  |      |

| Utilization of the power of ocean waves, A. W. Stahl.       438         Value of a water power, Chas. T. Main       140         WALWORTH, A. C., disc., amendment to rules.       40         " "report on standard flanges.       31         " "rise or fall of a mercurial thermometer.       75         Water power, value of a.       140         Water-wheels for high pressures.       331         Wave motors.       438         Webber, Samuel, disc., density of water.       411         Webber, Samuel, disc., density of water.       411         Webber, W. O., some tests of a portable boiler       413         " disc., equalizing draft for boilers.       245         " " lead in high-speed engines.       258         " " standard sizes for keys.       231         " " standard sizes for keys.       231         " " steam jackets of Pawtucket pumping engine       198         WHIELER, F. M., disc., feed-water purification.       248         " " steam jackets of Pawtucket pumping engine       198         WHITEHEAD, GEO. E., disc., threads on a half-inch bolt       247         Wilbraham, Thomas, memorial notice of.       678         Wire-rod rolling.       63         Wood, De Volson, disc., combination pavement.       205         " " test of a p  |  |       |
|--|--|-------|
| WALWORTH, A. C., disc., amendment to rules.       40         """ report on standard flanges.       31         """ rise or fall of a mercurial thermometer.       75         Water power, value of a.       140         Water-wheels for high pressures.       331         Wave motors.       438         Webber, Samuel, disc., density of water.       411         Webber, W. O., some tests of a portable boiler.       413         """ disc., equalizing draft for boilers.       245         """ standard sizes for keys.       231         """" standard sizes for keys.       231         """" threads on a half-inch bolt.       248         Wheeler, F. M., disc., feed-water purification.       248         """" steam jackets of Pawtucket pumping engine.       198         WHITTHEAD, GEO, E., disc., threads on a half-inch bolt.       247         Wilbraham, Thomas, memorial notice of.       678         Wive-rod rolling.       63         Wood, De Volson, disc., combination pavement.       205         """ test of a pulsometer.       211         Woodbury, C. J. H., disc., amendment to rules.       38         Woolson, O. C., disc., combination pavement.       205         """ test of a pulsometer.       205         """ test of a pulsometer. <td< td=""><td>Utilization of the power of ocean waves, A. W. Stahl</td><td>438</td></td<>                    | Utilization of the power of ocean waves, A. W. Stahl   | 438   |
| """ report on standard flanges.       31         """ rise or fall of a mercurial thermometer.       75         Water power, value of a.       140         Water-wheels for high pressures.       331         Wave motors.       438         Webber, Samuel, disc., density of water.       411         Webber, W. O., some tests of a portable boiler.       413         """ disc., equalizing draft for boilers.       245         """ standard sizes for keys.       231         """ threads on a half-inch bolt.       248         Wheeler, F. M., disc., feed-water purification.       248         """ steam jackets of Pawtucket pumping engine       198         Whitehead, Geo. E., disc., threads on a half-inch bolt       247         Wilbraham, Thomas, memorial notice of.       678         Wire-rod rolling.       63         Wood, De Volson, disc., combination pavement.       205         """ test of a pulsometer.       211         Woodbury, C. J. H., disc., amendment to rules.       40         """ test of a pulsometer.       205         """ t   | Value of a water power, Chas. T. Main                  | 140   |
| "" rise or fall of a mercurial thermometer.         75           Water power, value of a.         140           Water-wheels for high pressures.         331           Wave motors.         438           Webber, Samuel, disc., density of water.         411           Webber, W. O., some tests of a portable boiler.         413           " disc., equalizing draft for boilers.         245           " " lead in high-speed engines.         258           " " standard sizes for keys.         231           " " threads on a half-inch bolt.         248           Wheeler, F. M., disc., feed-water purification.         248           " " steam jackets of Pawtucket pumping engine.         198           Whitehead, Geo. E., disc., threads on a half-inch bolt.         247           Wilbraham. Thomas, memorial notice of.         678           Wire-rod rolling.         63           Wood, De Volson, disc., combination pavement.         205           " " test of a pulsometer.         211           Woodbury, C. J. H., disc., amendment to rules.         40           " " increase in life-fees.         38           Woolson, O. C., disc., combination pavement.         205           " " increase in life-fees.         38           Wootson, O. C., disc., combination pavement.         205 <td>WALWORTH, A. C., disc., amendment to rules</td> <td>40</td> | WALWORTH, A. C., disc., amendment to rules             | 40    |
| "" rise or fall of a mercurial thermometer.         75           Water power, value of a.         140           Water-wheels for high pressures.         331           Wave motors.         438           Webber, Samuel, disc., density of water.         411           Webber, W. O., some tests of a portable boiler.         413           " disc., equalizing draft for boilers.         245           " " lead in high-speed engines.         258           " " standard sizes for keys.         231           " " threads on a half-inch bolt.         248           Wheeler, F. M., disc., feed-water purification.         248           " " steam jackets of Pawtucket pumping engine.         198           Whitehead, Geo. E., disc., threads on a half-inch bolt.         247           Wilbraham. Thomas, memorial notice of.         678           Wire-rod rolling.         63           Wood, De Volson, disc., combination pavement.         205           " " test of a pulsometer.         211           Woodbury, C. J. H., disc., amendment to rules.         40           " " increase in life-fees.         38           Woolson, O. C., disc., combination pavement.         205           " " increase in life-fees.         38           Wootson, O. C., disc., combination pavement.         205 <td>" report on standard flanges</td> <td>31</td>               | " report on standard flanges                           | 31    |
| Water-wheels for high pressures.       331         Wave motors.       438         Webber, Samuel, disc., density of water.       411         Webber, W. O., some tests of a portable boiler.       413         "disc., equalizing draft for boilers.       245         "" lead in high-speed engines.       258         "" standard sizes for keys.       231         "" threads on a half-inch bolt.       248         Wheeler, F. M., disc., feed-water purification.       248         "" steam jackets of Pawtucket pumping engine.       198         Whitehead, Geo. E., disc., threads on a half-inch bolt.       247         Wilbraham, Thomas, memorial notice of.       678         Wire-rod rolling.       63         Wood, De Volson, disc., combination pavement.       205         "" test of a pulsometer.       211         Woodbury, C. J. H., disc., amendment to rules.       40         "" increase in life-fees.       38         Woolson, O. C., disc., combination pavement.       205         "" equalizing draft in boilers.       243         "" feed-water purification.       251         Worthen, William H., memorial notice of.       682  |  |       |
| Wave motors.       438         Webber, Samuel, disc., density of water.       411         Webber, W. O., some tests of a portable boiler.       413         "disc., equalizing draft for boilers.       245         "lead in high-speed engines.       258         ""standard sizes for keys.       231         """threads on a half-inch bolt.       248         Wheeler, F. M., disc., feed-water purification.       248         ""steam jackets of Pawtucket pumping engine.       198         Whitehead, Geo, E., disc., threads on a half-inch bolt.       247         Wilbraham, Thomas, memorial notice of.       678         Wire-rod rolling.       63         Wood, De Volson, disc., combination pavement.       205         ""test of a pulsometer.       211         Woodbury, C. J. H., disc., amendment to rules.       40         ""increase in life-fees.       38         Woolson, O. C., disc., combination pavement.       205         ""equalizing draft in boilers.       243         ""feed-water purification.       251         Worthen, William H., memorial notice of.       682   | Water power, value of a                                | 140   |
| Wave motors.       438         Webber, Samuel, disc., density of water.       411         Webber, W. O., some tests of a portable boiler.       413         "disc., equalizing draft for boilers.       245         "disc., equalizing draft for boilers.       258         "disc., equalizing draft for boilers.       258         "disc., equalizing draft for boilers.       258         "disc., equalizing draft for boilers.       231         "disc., drad draft sizes for keys.       231         "disc., disc., drad on a half-inch bolt.       248         Wheeler, F. M., disc., feed-water purification.       248         "disc., disc., threads on a half-inch bolt.       247         Wilbraham, Thomas, memorial notice of.       678         Wood, De Volson, disc., combination pavement.       205         "dest of a pulsometer.       211         Woodbury, C. J. H., disc., amendment to rules.       40         "discrease in life-fees.       38         Woolson, O. C., disc., combination pavement.       205         "dequalizing draft in boilers.       243         "ded-water purification.       251         Worthen, William H., memorial notice of.       682  | Water-wheels for high pressures                        | 331   |
| Webber, W. O., some tests of a portable boiler.       413         "disc., equalizing draft for boilers.       245         """ lead in high-speed engines.       258         """ standard sizes for keys.       231         """ threads on a half-inch bolt.       248         Wheeler, F. M., disc., feed-water purification.       248         """ steam jackets of Pawtucket pumping engine       198         Whitehead, Geo, E., disc., threads on a half-inch bolt       247         Wilbraham, Thomas, memorial notice of.       678         Wire-rod rolling.       63         Wood, De Volson, disc., combination pavement.       205         """ test of a pulsometer.       201         """ test of a pulsometer to rules.       40         """ increase in life-fees.       38         Woolson, O. C., disc., combination pavement.       205         """ equalizing draft in boilers.       243         """ feed-water purification.       251         Worthen, William H., memorial notice of.       682   |  |       |
| " disc., equalizing draft for boilers.       245         " " lead in high-speed engines.       258         " " standard sizes for keys.       231         " " threads on a half-inch bolt.       248         WHEELER, F. M., disc., feed-water purification.       248         " " steam jackets of Pawtucket pumping engine.       198         WHITEHEAD, GEO. E., disc., threads on a half-inch bolt.       247         Wilbraham, Thomas, memorial notice of.       678         Wire-rod rolling.       63         Wood, DE Volson, disc., combination pavement.       205         " " test of a pulsometer.       211         WOODBURY, C. J. H., disc., amendment to rules.       38         WOOLSON, O. C., disc., combination pavement.       205         " " increase in life-fees.       38         WOOLSON, O. C., disc., combination pavement.       205         " " equalizing draft in boilers.       243         " " feed-water purification.       251         Worthen, William H., memorial notice of.       682   | Webber, Samuel, disc., density of water                | 411   |
| """       lead in high-speed engines.       258         """       standard sizes for keys.       231         """       threads on a half-inch bolt.       248         WHEELER, F. M., disc., feed-water purification.       248         """       steam jackets of Pawtucket pumping engine       198         WHITEHEAD, GEO, E., disc., threads on a half-inch bolt       247         Wilbraham, Thomas, memorial notice of.       678         Wie-rod rolling.       63         Wood, De Volson, disc., combination pavement       205         """       test of a pulsometer       211         WOODBURY, C. J. H., disc., amendment to rules       241         """       increase in life-fees       38         WOOLSON, O. C., disc., combination pavement       205         """       equalizing draft in boilers       243         """       feed-water purification       251         Worthen, William H., memorial notice of       682   | Webber, W. O., some tests of a portable boiler         | 413   |
| ## ## ## ## ## ## ## ## ## ## ## ## ##   | " disc., equalizing draft for boilers                  | 245   |
| ## ## ## ## ## ## ## ## ## ## ## ## ##   | " " lead in high-speed engines                         | . 258 |
| WHEELER, F. M., disc., feed-water purification.       248         """ steam jackets of Pawtucket pumping engine.       198         WHITEHEAD, GEO, E., disc., threads on a half-inch bolt.       247         Wilbraham. Thomas, memorial notice of.       678         Wire-rod rolling.       63         Wood, De Volson, disc., combination pavement.       205         """ test of a pulsometer.       211         Woodbury, C. J. H., disc., amendment to rules.       40         """ increase in life-fees.       38         Woolson, O. C., disc., combination pavement.       205         """ equalizing draft in boilers.       243         """ feed-water purification.       251         Worthen, William H., memorial notice of.       682   | " standard sizes for keys                              | . 231 |
| """ steam jackets of Pawtucket pumping engine       198         WHITEHEAD, GEO, E., disc., threads on a half-inch bolt       247         Wilbraham, Thomas, memorial notice of.       678         Wire-rod rolling.       63         Wood, De Volson, disc., combination pavement       205         """ test of a pulsometer.       211         Woodbury, C. J. H., disc., amendment to rules       40         """ increase in life-fees       38         Woolson, O. C., disc., combination pavement       205         """ equalizing draft in boilers       243         """ feed-water purification       251         Worthen, William H., memorial notice of       682  | " " threads on a half-inch bolt                        | . 248 |
| WHITEHEAD, GEO. E., disc., threads on a half-inch bolt.         247           Wilbraham. Thomas, memorial notice of.         678           Wire-rod rolling.         63           Wood, De Volson, disc., combination pavement.         205           "test of a pulsometer.         211           Woodbury, C. J. H., disc., amendment to rules         40           "increase in life-fees.         38           Woolson, O. C., disc., combination pavement.         205           "equalizing draft in boilers.         243           "feed-water purification.         251           Worthen, William H., memorial notice of.         682   | WHEELER, F. M., disc., feed-water purification         | . 248 |
| Wilbraham, Thomas, memorial notice of.       678         Wire-rod rolling.       63         Wood, De Volson, disc., combination pavement.       205         " test of a pulsometer.       211         Woodbury, C. J. H., disc., amendment to rules.       40         " increase in life-fees.       38         Woolson, O. C., disc., combination pavement.       205         " equalizing draft in boilers.       243         " " feed-water purification.       251         Worthen, William H., memorial notice of.       682  | " steam jackets of Pawtucket pumping engine            | . 198 |
| Wire-rod rolling.       63         Wood, De Volson, disc., combination pavement.       205         " test of a pulsometer.       211         Woodbury, C. J. H., disc., amendment to rules       40         " "increase in life-fees.       38         Woolson, O. C., disc., combination pavement.       205         " "equalizing draft in boilers.       243         " "feed-water purification.       251         Worthen, William H., memorial notice of.       682   | WHITEHEAD, GEO. E., disc., threads on a half-inch bolt | . 247 |
| Wood, De Volson, disc., combination pavement       205         " test of a pulsometer.       211         Woodbury, C. J. H., disc., amendment to rules       40         " "increase in life-fees       38         Woolson, O. C., disc., combination pavement       205         " "equalizing draft in boilers       243         " "feed-water purification       251         Worthen, William H., memorial notice of       682  | Wilbraham, Thomas, memorial notice of                  | . 678 |
| " test of a pulsometer       211         WOODBURY, C. J. H., disc., amendment to rules.       40         " increase in life-fees.       38         WOOLSON, O. C., disc., combination pavement.       205         " equalizing draft in boilers.       243         " "feed-water purification.       251         Worthen, William H., memorial notice of.       682  | Wire-rod rolling                                       | . 63  |
| WOODBURY, C. J. H., disc., amendment to rules.       40         """ increase in life-fees.       38         WOOLSON, O. C., disc., combination pavement.       205         """ equalizing draft in boilers.       243         """ feed-water purification.       251         Worthen, William H., memorial notice of.       682  | WOOD, DE Volson, disc., combination pavement           | . 205 |
| """ increase in life-fees.       38         Woolson, O. C., disc., combination pavement.       205         """ equalizing draft in boilers.       243         """ feed-water purification.       251         Worthen, William H., memorial notice of.       682  | " test of a pulsometer                                 | . 211 |
| """ increase in life-fees.       38         Woolson, O. C., disc., combination pavement.       205         """ equalizing draft in boilers.       243         """ feed-water purification.       251         Worthen, William H., memorial notice of.       682  | WOODBURY, C. J. H., disc., amendment to rules          | . 40  |
| " " equalizing draft in boilers.       243         " " feed-water purification.       251         Worthen, William H., memorial notice of.       682   |  |       |
| " " feed-water purification. 251 Worthen, William H., memorial notice of. 682  | Woolson, O. C., disc., combination pavement            | . 205 |
| Worthen, William H., memorial notice of. 682   | " equalizing draft in boilers                          | . 243 |
|  | " " feed-water purification                            | . 251 |
| Worthington, C. C., letter to  | Worthen, William H., memorial notice of                | . 682 |
|  | Worthington, C. C., letter to                          | . 18  |